IFW AF 2881

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

JEROME L. ELKIND ET AL.

Serial No. 09/823,715 (TI-29069)

Filed March 30, 2001

For: SYSTEM FOR DIRECTED MOLECULAR INTERACTION
IN SURFACE PLASMON RESONANCE ANALYSIS

Art Unit 2881

Examiner David A. Vanore

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BRIEF ON APPEAL

REAL PARTY IN INTEREST

The real party in interest is Texas Instruments Incorporated, a Delaware corporation with offices at 7839 Churchill Way, Dallas, Texas 75251.

RELATED APPEALS AND INTERFERENCES

There are no known related appeals and/or interferences.

STATUS OF CLAIMS

This is an appeal of claims 9 to 16 and 19 to 21, all of the rejected claims. Claims 22 and 23 have been allowed. Please charge any costs to Deposit Account No. 20-0668.

STATUS OF AMENDMENTS

An amendment was not filed after a second or subsequent rejection.

SUMMARY OF INVENTION

The invention relates to a sample delivery and sensing unit for directed molecular interaction during surface plasmon resonance analysis. The system includes an electrically conductive surface plasmon resonance layer;(116, 214), an integrally formed surface plasmon resonance sensor in optic communication with the surface plasmon resonance layer, the sensor having a housing (204) transparent to a given frequency of light, and, within the housing, a source of the given frequency of light (202) directed onto the surface plasmon resonance layer and a photodetector array (216) for receiving the given frequency of light reflected from the plasmon resonance detector. A flow cell (100) of Fig. 1) is attached to the surface plasmon resonance layer, having a fluid path (104), the fluid path having an analyte detection chamber (102) disposed along the fluid path, the analyte detection chamber having an interior region in fluidic communication with the surface plasmon resonance layer and having means for generation of a molecular interaction bias across the analyte detection chamber (electrodes 118, 120 across the detection chamber). In the case where the bias provides an electric field, the electrodes provide a capacitor created within the flow cell (page 7, lines 11 to 14). The molecular interaction bias can be magnetic (page 8, line 21ff).

ISSUES

The issues on appeal are as follows:

1. Whether claims 9, 11, 12, 14, 15 and 19 to 21 are anticipated by Nelson (U.S. 5,955,729) under 35 U.S.C. 102(b).

2. Whether claims 10, 13 and 16 are anticipated by Leland et al. (U.S. 6,325,973) under 35 U.S.C. 102(e).

GROUPING OF CLAIMS

The claims stand or fall together for reasons as set forth hereinbelow under ARGUMENT.

ARGUMENT

ISSUE 1

Claims 9, 11, 12, 14, 15 and 19 to 21 were rejected as being anticipated by Nelson (U.S. 5,955,729) under 35 U.S.C. 102(b). The rejection is without merit.

Claim 11 requires, among other features, in directed molecular interaction during surface plasmon resonance analysis , in addition to an integrally formed surface plasmon resonance sensor having a housing transparent to electromagnetic radiation of a given frequency range and, within the housing, a source of electromagnetic radiation having the given frequency range and a photodetector array disposed adjacent the surface of the housing, such that radiation from the source reflects off the surface and strikes the photodetector array and a thin surface plasmon resonance layer in optic communication with an exterior surface of the integrally formed surface plasmon resonance sensor, a fluid path having an analyte detection chamber in fluidic communication with the surface

plasmon resonance layer having means for generating a molecular interaction bias across the analyte detection chamber to direct bias responsive conjugated molecules to the surface plasmon resonance layer. No such feature as underline above is taught or even remotely suggested by Nelson. The Examiner refers to the electrodes in Fig. 5 of Nelson, specifically electrodes 544, 580, 582 and 586. However, nowhere in Nelson et al. is there one iota of a statement or inference that these electrodes generate a molecular interaction bias across the analyte detection chamber to direct bias responsive conjugated molecules to the surface plasmon resonance layer. There mere fact that Nelson has electrodes in no way is an anticipation of the claimed structure, let alone the function required by the claimed structure. It follows that both the above described claimed feature as well as the combination of claim 11 defines patentably over Nelson under 35 U.S.C. 102.

Claim 12 depends from claim 11 and therefore defines patentably over Nelson for the reasons set for the above with reference to claim 11.

Claim 14 relates to a method for kinetically controlled surface plasmon resonance analysis and, in addition to requiring the steps of providing a surface plasmon resonance sensor having a surface plasmon layer in optical communication with the sensor, derivatizing the surface plasmon layer and providing a fluid path having an analyte detection chamber in fluidic communication with the derivatized surface plasmon layer, the step of providing means in the chamber for generating a molecular interaction bias across the chamber, No such step is taught or suggested by Nelson as discussed above with reference to claim 11.

Claim 14further requires the step of providing a conjugate between an analyte and a bias responsive moiety, wherein the analyte is reactive with the derivatized surface

plasmon layer and the bias responsive moiety changes the response of the analyte to the molecular interaction bias. No such step is taught by Nelson since Nelson does not have the required bias to begin with as discussed above with reference to claim 11.

Claim 14 yet further requires, in addition to the step of introducing the conjugated analyte into the chamber, the step of generating the molecular interaction bias within the chamber. No such step is taught by Nelson as discussed above with reference to claim 11.

Claim 15, 19 and 20 depend from claim 14 and therefore defines patentably over Nelson for the reasons stated above with reference to claim 14.

Claim 21 relates to a sample delivery and sensing unit for directed molecular interaction during surface plasmon resonance analysis and includes, in addition to an electrically conductive surface plasmon resonance layer. an integrally formed surface plasmon resonance sensor in optic communication with the surface plasmon resonance layer, the sensor having a housing transparent to a given frequency of light, and, within the housing, a source of the given frequency of light directed onto the surface plasmon resonance layer and a photodetector array for receiving the given frequency of light reflected from the plasmon resonance detector, a flow cell attached to the surface plasmon resonance layer, having a fluid path, the fluid path having an analyte detection chamber disposed along the fluid path, the analyte detection chamber having an interior region in fluidic communication with the surface plasmon resonance layer and having means for generation of a molecular interaction bias across the analyte detection chamber. No such feature is taught or suggested by Nelson either alone or in the total combination as claimed as discussed above with reference to claim 11.

Claim 9 depends from claim 21 and therefore defines patentably over Nelson for the reasons stated above with reference to claim 21.

ISSUE 2

Claims 10, 13 and 16 were rejected as being anticipated by Leland et al. (U.S. 6,325,973) under 35 U.S.C. 102(e). The rejection is without merit.

Claim 13 relates to a sample delivery and sensing unit for directed molecular interaction during surface plasmon resonance analysis which, in addition to including an integrally formed surface plasmon resonance sensor having a housing transparent to electromagnetic radiation of a given frequency range and, within the housing, a source of electromagnetic radiation having the given frequency range and, a photodetector array disposed adjacent the surface of the housing, such that radiation from the source reflects off the surface and strikes the photodetector array and a thin surface plasmon resonance layer in optic communication with an exterior surface of the integrally formed surface plasmon resonance sensor, an analyte detection chamber in fluidic communication with the surface plasmon resonance layer having means for generating a molecular interaction bias across the analyte detection chamber to direct bias responsive conjugated molecules to the surface plasmon resonance layer, the molecular interaction bias being magnetic. No such feature is taught or suggested by Lelend et al.

While Leland et al. discloses electrodes 56,58, nothing is Leland et al. teaches or even remotely suggests that the purpose of these electrodes is to generate a molecular interaction bias across the analyte detection chamber to direct bias responsive conjugated molecules to the surface plasmon resonance layer. Furthermore, the electrodes do not

provide a magnetic molecular interaction bias. It follows that Leland et al. fails to teach the above noted portion of claim 13 either alone or in the combination as claimed.

Claim 16 relates to a method for kinetically controlled surface plasmon resonance analysis and, in addition to including the steps of providing a surface plasmon resonance sensor having a surface plasmon layer in optical communication with the sensor, derivatizing the surface plasmon layer and placing an analyte detection chamber in fluidic communication with the derivatized surface plasmon layer, further requiring the step of providing means in the chamber for generating a molecular interaction bias across the chamber. No such step is taught or suggested by Leland et al. either alone or in the combination as claimed as discussed above with reference to claim 13.

Claim 16 further requires the step of providing a conjugate between an analyte and a bias responsive moiety, the analyte being reactive with the derivatized surface plasmon layer and the bias responsive moiety changing the response of the analyte to the molecular interaction bias. This step is nowhere taught by Leland either alone or in the combination as claimed, especially since there is no bias in Leland et al. of the type claimed.

Claim 16 yet further requires the step of generating the molecular interaction bias within the chamber. No such step is taught by Leland et al either alone or in the combination as claimed for reasons stated above.

CONCLUSIONS

For the reasons stated above, reversal of the final rejection and allowance of the claims on appeal is requested that justice be done in the premises.

Respectfully submitted,

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APPENDIX

The claims on appeal read as follows:

Claim 9 The unit of claim 21 wherein the molecular interaction bias is electrical.

Claim 10 A sample delivery and sensing unit for directed molecular interaction during surface plasmon resonance analysis comprising:

an electrically conductive surface plasmon resonance layer;

an integrally formed surface plasmon resonance sensor in optic communication with the surface plasmon resonance layer, said sensor having a housing transparent to a given frequency of light, and, within said housing, a source of the given frequency of light directed onto said surface plasmon resonance layer and a photodetector array for receiving said given frequency of light reflected from said plasmon resonance detector; and

a flow cell attached to the surface plasmon resonance layer, having a fluid path, said fluid path having an analyte detection chamber disposed along the fluid path, said analyte detection chamber having an interior region in fluidic communication with the surface plasmon resonance layer and having means for generation of a molecular interaction bias across the analyte detection chamber;

wherein the molecular interaction bias is magnetic.

11. A sample delivery and sensing unit for directed molecular interaction during surface plasmon resonance analysis comprising:

an integrally formed surface plasmon resonance sensor having a housing transparent to electromagnetic radiation of a given frequency range and, within said housing, a source of electromagnetic radiation having the given frequency range and a photodetector array disposed adjacent the surface of the housing, such that radiation from the source reflects off the surface and strikes the photodetector array;

a thin surface plasmon resonance layer in optic communication with an exterior surface of the integrally formed surface plasmon resonance sensor; and

a fluid path having an analyte detection chamber in fluidic communication with the surface plasmon resonance layer having means for generating a molecular interaction bias across the analyte detection chamber to direct bias responsive conjugated molecules to the surface plasmon resonance layer.

Claim 12 The unit of claim 11 wherein the molecular interaction bias is electrical.

Claim 13 A sample delivery and sensing unit for directed molecular interaction during surface plasmon resonance analysis comprising:

an integrally formed surface plasmon resonance sensor having a housing transparent to electromagnetic radiation of a given frequency range and, within said housing, a source of electromagnetic radiation having the given frequency range and, a photodetector array disposed adjacent the surface of the housing, such that radiation from the source reflects off the surface and strikes the photodetector array;

a thin surface plasmon resonance layer in optic communication with an exterior surface of the integrally formed surface plasmon resonance sensor; and

an analyte detection chamber in fluidic communication with the surface plasmon resonance layer having means for generating a molecular interaction bias across the analyte detection chamber to direct bias responsive conjugated molecules to the surface plasmon resonance layer;

wherein the molecular interaction bias is magnetic.

Claim 14 A method for kinetically controlled surface plasmon resonance analysis comprising:

providing a surface plasmon resonance sensor having a surface plasmon layer in optical communication with the sensor;

derivatizing the surface plasmon layer;

providing a fluid path having an analyte detection chamber in fluidic communication with the derivatized surface plasmon layer;

providing means in the chamber for generating a molecular interaction bias across the chamber;

providing a conjugate between an analyte and a bias responsive moiety, wherein the analyte is reactive with the derivatized surface plasmon layer and the bias responsive moiety changes the response of the analyte to the molecular interaction bias;

introducing the conjugated analyte into the chamber;

generating the molecular interaction bias within the chamber; and

determining changes in surface plasmon resonance due to association of the conjugated analyte to the derivatized surface plasmon layer.

Claim 15 The method of claim 14 wherein the molecular interaction bias is electrical.

Claim 16 A method for kinetically controlled surface plasmon resonance analysis comprising:

providing a surface plasmon resonance sensor having a surface plasmon layer in optical communication with the sensor;

derivatizing the surface plasmon layer;

placing an analyte detection chamber in fluidic communication with the derivatized surface plasmon layer;

providing means in the chamber for generating a molecular interaction bias across the chamber;

providing a conjugate between an analyte and a bias responsive moiety, wherein the analyte is reactive with the derivatized surface plasmon layer and the bias responsive moiety changes the response of the analyte to the molecular interaction bias;

introducing the conjugated analyte into the chamber;

generating the molecular interaction bias within the chamber; and

determining changes in surface plasmon resonance due to association of the conjugated analyte to the derivatized surface plasmon layer;

wherein the molecular interaction bias is magnetic.

Claim 19. The method of claim 14 wherein the conjugated analyte is for the kinetically enhanced measurement of molecular interactions in the groups consisting of: avidin-biotin binding, antibody-antigen binding, antibody-antigen dissociation kinetics, protein binding, protein-nucleic acid binding, specific detection of small molecules, concentration of analytes, measurement of oligonucleotide complements, mixture proportions, receptor-ligand interactions, aptamer interactions, and molecular assembly events.

Claim 20 The method of claim 19 wherein the conjugated analyte is for the kinetically enhanced measurement of molecular interactions in competitive binding assays.

Claim 21 A sample delivery and sensing unit for directed molecular interaction during surface plasmon resonance analysis comprising:

an electrically conductive surface plasmon resonance layer;

an integrally formed surface plasmon resonance sensor in optic communication with the surface plasmon resonance layer, said sensor having a housing transparent to a given frequency of light, and, within said housing, a source of the given frequency of light directed onto said surface plasmon resonance layer and a photodetector array for receiving said given frequency of light reflected from said plasmon resonance detector; and

a flow cell attached to the surface plasmon resonance layer, having a fluid path, said fluid path having an analyte detection chamber disposed along the fluid path, said analyte detection chamber having an interior region in fluidic communication with the surface plasmon resonance layer and having means for generation of a molecular interaction bias across the analyte detection chamber.